

REMARKS

Applicants have amended claims 24 and 25. Claims 24-38 and 40-44, of which claim 24 is independent in form, are presented for examination.

The Examiner has rejected claims 24-38 and 40-44 as anticipated by Read et al., "Low Temperature Performance of λ -MnO₂ in Lithium Primary Batteries," *Electrochemical and Solid-State Letters*, Vol. 4, No. 10, pp. A162-165 (2001) ("Read") under 35 U.S.C. § 102(a), and/or as obvious in view of Read under 35 U.S.C. § 103(a).

As amended, claims 24-38 and 40-44 recite a method of manufacturing an electrochemical cell. The method includes selecting a lambda manganese oxide that, when incorporated into a positive electrode of a cell, can provide the cell with a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. The method also includes incorporating the lambda manganese oxide into a positive electrode, and forming a cell including the positive electrode and a lithium negative electrode. The cell has a closed circuit voltage of about 4V and a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. But claims 24-38 and 40-44 are not anticipated by Read or obvious in view of Read, at least because Read fails to disclose or suggest a method of manufacturing a cell including selecting a lambda manganese oxide that, when incorporated into a positive electrode of a cell, can provide the cell with a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. Read also fails to disclose or suggest a cell having a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g.

Read discloses a cell that includes a lambda-manganese dioxide cathode material formed by acid digestion of a LiMn₂O₄ spinel. (See Read, page A162.) Read discharges the cell at a discharge rate of 1.0 mA/cm², to a cutoff voltage of 2.0 V. (See *id.*) The resulting discharge curve (Figure 1 of Read) is reproduced below:

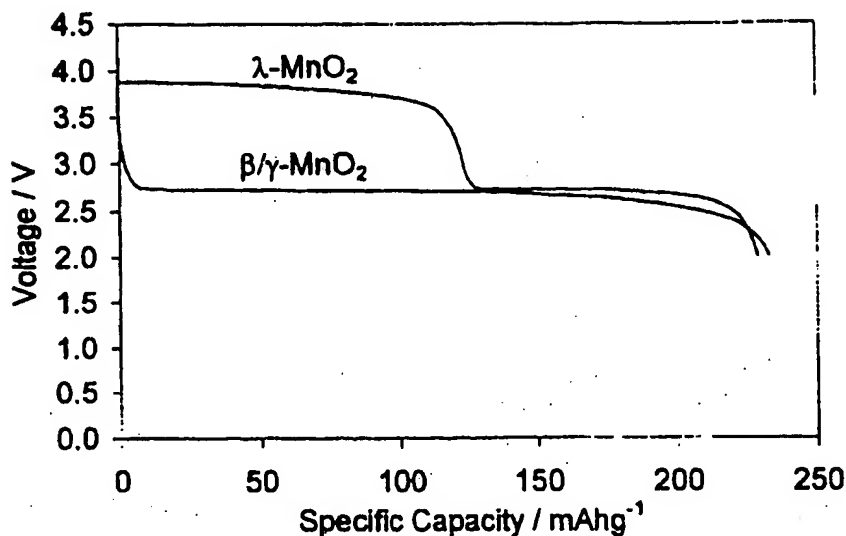


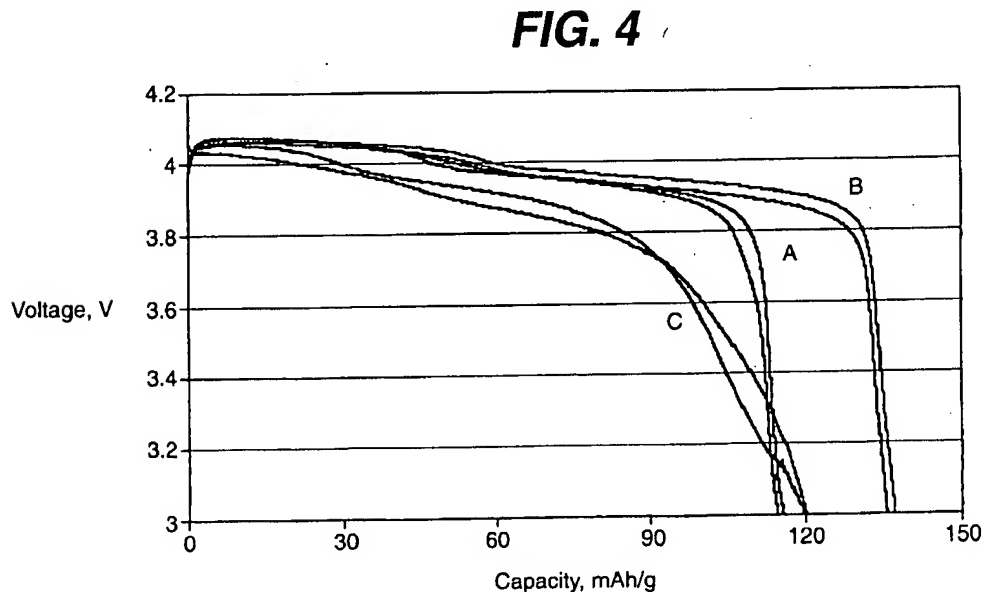
Figure 1. Specific capacity of λ -MnO₂ and β/γ -MnO₂ at 1.0 mA/cm² and 20°C.

As shown in Figure 1, and as the Examiner has conceded (see September 29, 2005 Office Action, page 3), Read's lambda-manganese dioxide cell does not have a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. However, the Examiner has stated that "there is nothing on record to show the differences between the claimed method and the method taught by Read et al.", and that, "[t]here is nothing on the record to explain how the same method steps using the same starting materials can give different properties." (*Id.* at pages 3-4.)

But Read's method does not use the same starting materials as the example methods disclosed in Applicants' specification. Read's method uses a λ -MnO₂ prepared by acid digestion of L203, a LiMn₂O₄ spinel from Chemetals. (See Read, page A162.) Applicants' example methods, on the other hand, use lambda manganese dioxide prepared from "spinel A" (Li_{1.06}Mn_{1.94}O₄, from Kerr-McGee, #210), "spinel B" (Li_{1.01}Mn_{1.99}O₄, from Carus Chemical Co.), or "spinel C" (LMO-800E, a spinel having a nominally stoichiometric composition, from

Erachem/Chemetals). (See Application, pages 11-13.)¹ As Applicants explain in their specification, the type of spinel that is used to prepare a lambda manganese oxide affects the specific discharge capacity of the cell:

Typical discharge curves for cells containing the λ -MnO₂ samples prepared from various commercial spinels are shown in Figure 4 [reproduced below]. Lithium cells with composite cathodes containing λ -MnO₂ from spinel C discharged to a 3V cutoff at a nominal rate of about 1.0 mA/cm² gave specific capacities of about 120 mAh/g. Under similar discharge conditions, cells with composite cathodes containing λ -MnO₂ prepared from the spinel B gave a substantially greater specific capacity of about 135 mAh/g. . . . Based on the discharge data for cells shown in Figure 4, the λ -MnO₂ prepared from spinel B clearly provides superior low-rate discharge performance compared to λ -MnO₂ derived from either spinel A or spinel C. (Application, pages 13-14, emphasis added.)



¹ Applicants note that on page 12, line 31 of the specification, "spinel B" should actually be "spinel C", as is clear from page 13, lines 23-28 of the specification.

Thus, while Read might disclose a method having some similarities to Applicants' example methods, Reid fails to disclose or suggest selecting a lambda manganese oxide that, when incorporated into a positive electrode of a cell, can provide the cell with a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. Rather, Reid discloses selecting a lambda manganese dioxide that, when incorporated into a positive electrode of a cell, provides the cell with a specific discharge capacity at a discharge rate of 1 mA/cm² to a 3V cutoff of less than 130 mAh/g. Thus, Reid fails to disclose a method that is covered by claims 24-38 and 40-44, and accordingly does not anticipate claims 24-38 and 40-44.

The Examiner also has asserted that a cell having a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g is obvious in view of Read. More specifically, the Examiner has asserted that although Read discloses a specific discharge capacity of around 120 mAh/g, and does not disclose a specific discharge capacity of 130, 135, or 140 mAh/g or greater,

[i]t would have been obvious to one having ordinary skill in the art at the time the invention was made to . . . design the cell to have a specific discharge capacity greater than 140 mAh/g since it has been held that where general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. (See September 29, 2005 Office Action, page 5.)

But Read fails to disclose or suggest how to form a cell with a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g, or that such a cell having such a discharge capacity can even be achieved. For example, Read fails to disclose or suggest selecting a lambda manganese oxide that, when incorporated into a positive electrode of a cell, can provide the cell with a specific discharge capacity at a nominal discharge rate of 1 mA/cm² to a 3V cutoff of greater than 130 mAh/g. Thus, Read fails to suggest a method covered by Applicants' claims.

Because Read fails to disclose or suggest a method covered by claims 24-38 and 40-44, these claims are neither anticipated by Read, nor obvious in view of Read. Accordingly, for at

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least the reasons discussed above, Applicants believe that claims 24-38 and 40-44 are in condition for allowance, which action is requested.

Enclosed is a check for the Petition for Extension of Time fee. Please apply any charges or credits to deposit account 06-1050.

Respectfully submitted,

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Jeffe A. Kopczynski
Reg. No. 56,395

Fish & Richardson P.C.
225 Franklin Street
Boston, MA 02110
Telephone: (617) 542-5070
Facsimile: (617) 542-8906

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